APPENDIX B

TANK STRAPPING

Terms

There are a number of terms used in describing tank strapping procedures. Some of these terms are defined below.

- Tank Height. Tank height is the distance from the top of the tank shell to the inside surface of the tank floor.
- Oil (Product) Height. Oil (product) height is the highest fill point of the tank. This is not necessarily the top of the tank.
- Deadwood. Deadwood is any part of the interior of the tank that reduces or adds to the volume. Such items as ladders, supports, bolts, nuts, and channels are deadwood in the tank.

METHODS

As a rule, a strapping chart is prepared for each storage tank because tanks of the same size may vary in capacity. Storage tanks must be filled before they are strapped, because the walls expand slightly when the tanks are filled. Tank strapping methods are given below.

All-Rings

The all-rings method is very accurate. Its error rate is only one-fiftieth of 1 percent. This method requires the following:

- Measurement of the outside circumference of each ring of the tank.
- Measurement of the height of each ring of the tank.
- Computation of the inside diameter of each ring of the tank.
- Computation of the volume of the tank.

Average Circumference

The average circumference method is less accurate than the all-rings method. This method results in an average of one-tenth of 1 percent error. The average circumference method requires the following:

- Measurement of the outside circumference of all rings of the tank and the average of these measurements.
- Computation of the diameter from the circumference averages.
- Computation of the inside diameter of the tank.
- Computation of the volume of the tank.

One-Ring

The one-ring method has an error rate of about one-fifth of 1 percent. This method requires the following:

- Measurement of the diameter of the second or third ring of the tank.
- Measurement of the total height of the tank.
- Computation of the inside diameter of the tank.
- Computation of the volume of the tank.

Computation

This paragraph gives an example of a tank strapping computation on a single-ring tank as shown in Figure B-1, pageB-3. The information on tank measurements and deadwood that is needed in the strapping procedure is given in
Table B-1, page B-4

- First, find the OD of the tank.

$$OD = \frac{\text{circumference}}{\pi}$$

$$OD = \frac{40.5}{3.1416}$$

OD = 12.9 feet

- Then find the ID of the tank.

ID = OD - 2 x wall thickness

ID = 12.9 feet - 2 (.04 feet)

ID = 12.82 feet

- Now find the V of the tank, uncorrected for deadwood.

$$V = \frac{\pi \text{ ID2 height x 7.48 gallons per cubic foot}}{4}$$

$$V = \frac{3.1416 (12.82^2) 20 \times 7.48}{4}$$

V = 2580 x 7.48

V = 19300.5 gallons (uncorrected)

- Find the volume of the pipe connection and the cleanout door.

$$V \text{ pipe connection} = \frac{\pi \text{ D } H^2 \times 7.48}{4}$$

$$V \text{ pipe connection} = \frac{3.1416 (.67^2) \quad 2 \times 7.48}{4}$$

V pipe connection = 5.27 gallons

V cleanout door = length x height x depth x 7.48

V cleanout door = 3 x 5 x 1 x 7.48

V cleanout door = 112.2

- Now find the volume of the deadwood. The only deadwood in this tank is the roof support.

$$V \text{ roof support} = \frac{\pi \ D_2 \ H \times 7.48}{4}$$

$$V \text{ roof support} = \frac{3.1416 \ (.5_2) \ 20 \times 7.48}{4}$$

V roof support = 29.32 gallons

- Find the total volume of the tank.

V uncorrected + V cleanout door + V pipe connection = total volume

19,300.5 + 112.2 + 5.27
= 10,417.97 gallons

- Now, subtract the deadwood from the total volume to get the total corrected volume of the tank.

19,417.97 - V roof support
= total corrected volume
19,417.97 - 29.32 = 19,388.65 gallons

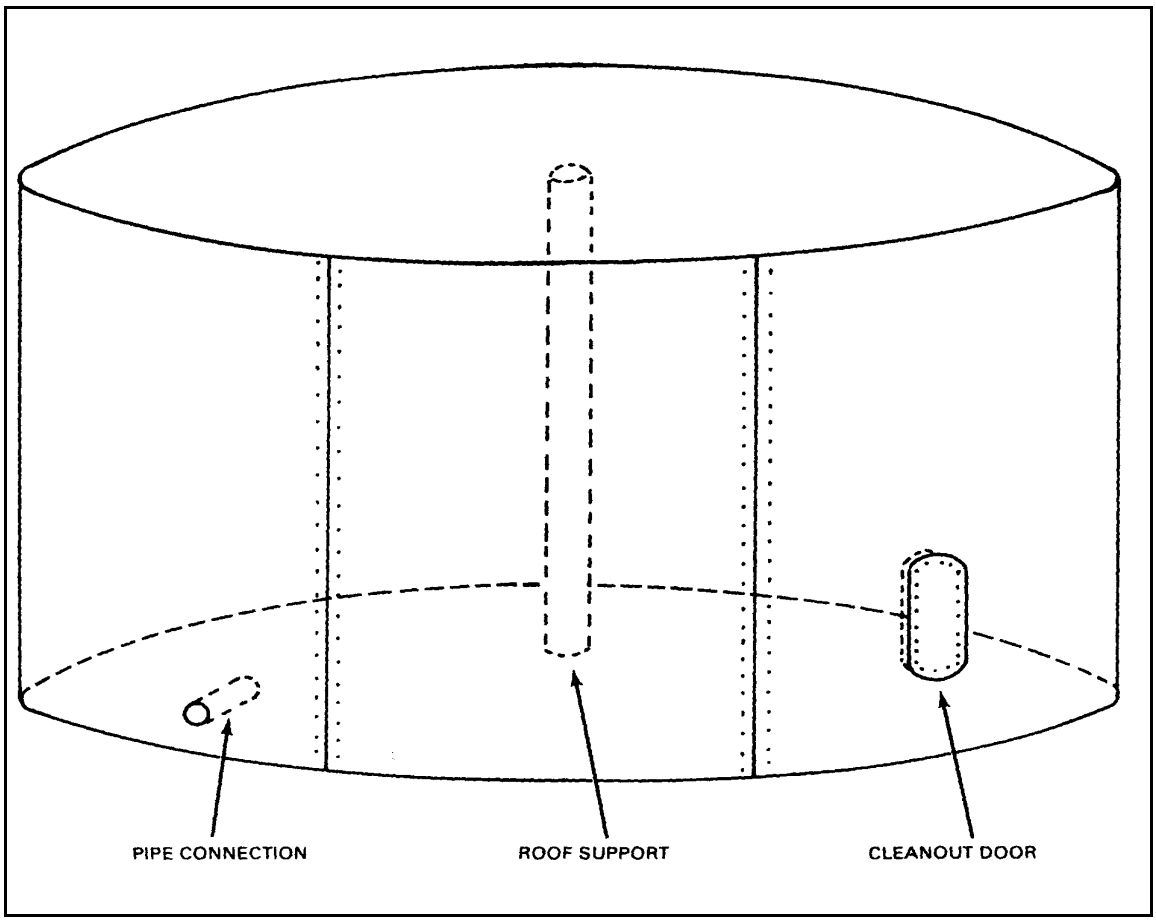

Figure B-1. Single ring tank

Table B-1. Tank measurements and deadwood

TANK	MEASUREMENTS
Outside circumference	40 feet 6 inches
Wall thickness	1/2 inch
Height	20 feet
Pipe connection	2 feet long, 8 inches in diameter
Cleanout door	3 feet by 5 feet by 1 foot
DEADWOOD	MEASUREMENTS
Roof support	6 inches in diameter
Pipe connection	2 feet long, 8 inches in diameter
Cleanout door	3 feet by 5 feet by 1 foot